HybridSil Icephobic Nanocomposites for Next Generation Aircraft In-Flight Icing Measurement and Mitigation, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

The purpose of this Phase I SBIR program is to adapt NanoSonic's HybridSil™ nanocomposites that combine high levels of erosion resistance and anti-icing functionality to enable in-flight icing measurement and mitigation for next generation aircraft. Icing on engine components, rotors, and wings creates substantial problems during in-flight operation. To address the issues of both in-flight icing measurement and mitigation, NanoSonic will build on its demonstrated HybridSil™ Erosion protective, anti-icing appliqu?s/tapes designed for rotorblades to realize a lightweight nanocomposite with appropriate functionality to enable multifunctional icing measurement and mitigation on next generation aircraft. NanoSonic's current HybridSil™ Erosion has been measured to provide high levels of particle and rain erosion protection; samples have been tested up to 7 hrs rain erosion and 100 g/cm2 mass loading angular sand, both tested at 500 mph, with sample survival following exposure. Additionally, the nanocomposite materials have been demonstrated to prevent dynamic ice accretion at temperatures as low as 19? F (-7?C) in their current tape format. Application has been demonstrated thus far with excellent adhesion and performance on 6Al4V Ti, 2024 T0 Al, and glass fiber/epoxy composites. A prime that provides de-icing systems to a broad range of commercial and defense platforms is currently working with NanoSonic for baseline performance evaluation of its HybridSil™ Erosion/Icephobic materials, and has discussed with NanoSonic methodologies to integrate multifunctionality, such as developing icing measurement concepts, for a broad range of existing and future aircraft. This prime has expressed significant interest and support of NanoSonic's materials development, and will work with NanoSonic through a subcontract on this effort to integrate design suggestions and perform rigorous measurements required for transition to NASA platforms.

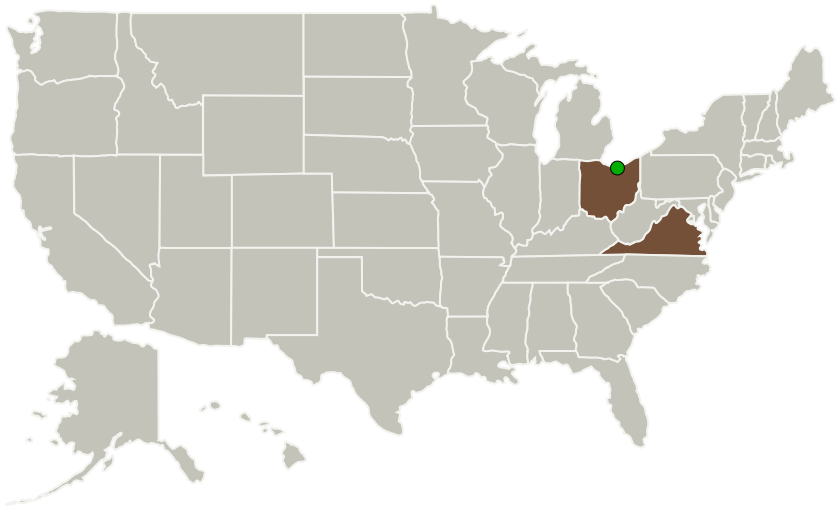
HybridSil Icephobic Nanocomposites for Next Generation Aircraft In-Flight Icing Measurement and Mitigation, Phase I

Table of Contents

HybridSil Icephobic Nanocomposites for Next Generation Aircraft In-Flight Icing Measurement and Mitigation, Phase I

Completed Technology Project (2012 - 2012)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140252)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nanosonic, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael J Bortner

Co-Investigator:

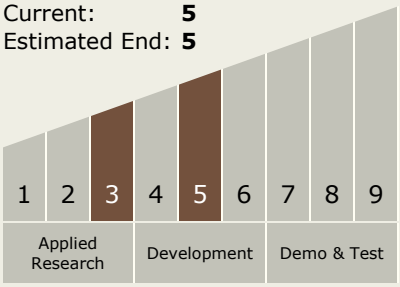
Michael Bortner

HybridSil Icephobic Nanocomposites for Next Generation Aircraft In-Flight Icing Measurement and Mitigation, Phase I

Completed Technology Project (2012 - 2012)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.11 Engine Icing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System